IN THE TITLE:

Please change the title to: **AN ACTIVE SURFACE EXCHANGE CATHETER AND METHOD.**

IN THE CLAIMS:

Set forth below in ascending order, with status identifiers, is a complete listing of all claims currently under examination. Changes to any amended claims are indicated by strikethrough and underlining. This listing also reflects any cancellation and/or addition of claims.

1. (cancelled). A method of altering a selected property of a body fluid comprising the steps of:

   inserting an exchange catheter into a body cavity so that a surface of the catheter is in contact with a body fluid;

   providing a working fluid within said catheter conditioned to alter said body fluid property by means of interaction between said fluids through said surface; and

   applying pulsating energy through a source external to said cavity to said catheter surface for increasing interaction between said fluids.

2. (cancelled). A method according to claim 1 wherein said energy applying step comprises inducing pressure pulses in said working fluid.

3. (cancelled). A method according to claim 1 wherein said pulsating energy applying step comprise circulating said working fluid through said catheter and cyclically reversing the direction of circulation of said fluid.

4. (cancelled). A method according to claim 1 wherein said pulsating energy induces oscillations in portions of said surface for transferring energy to said body fluid for reducing boundary layer thicknesses between said body fluid and said surface.

5. (cancelled). A system for altering a body fluid comprising:

an exchange catheter for insertion into a body cavity so that a surface of said catheter is in contact with said body fluid;

a control system for circulating a working fluid through said catheter and into contact with said surface and for conditioning said working fluid for altering said body fluid by means of interaction between said working fluid and said body fluid through said surface; and said control system including means for transferring pulsating energy to said catheter surface for increasing the interaction between said fluids.

6. (cancelled). A system according to claim 5 wherein said surface is the outside surface of a wall of an elongated tube through which said working fluid is circulated, said wall have spaced part portion of high compliance and said transferring means comprises means for inducing pressure pulses in said circulating fluid causing surface undulations of said high compliance portions for transferring energy to said body fluid.

7. (cancelled). A system according to claim 5 wherein said surface is the outside surface of an elongated balloon, and said energy transferring means comprises means for inducing pressure pulses in said circulating fluid for cyclically inflating and deflating said balloon for inducing mixing in said body fluid.

8. (cancelled). A system according to claim 5 wherein a portion of said exchange surface enables interconnection between said exchange catheter with distal protection filters for alignment of said exchange catheter within said body cavity.

9. (cancelled). A system according to claim 5 wherein a portion of said exchange surface enables variable rates of said working fluid infusion for rapid cooling of said body fluid.

10. (cancelled). A system according to claim 7 including a plurality of tubes disposed in adjacent parallel relation to said balloon, each of said tubes having an outside surface in contact with said body fluid for interaction with working fluids circulating through said tubes and interaction between said body fluid and working fluids within said tubes being increased by the balloon induced mixing of said body fluid.

11. (cancelled). A system according to claim 5 wherein said catheter comprises a plurality of parallel hollow tubes arranged in a bundle disposed between first and second manifolds at opposite ends of said bundle, and transfer means for conveying a working fluid from said control system to said first manifold for flow of said fluid through all of said tubes to said second manifold through said transfer means back to said control system.

12. (cancelled). A system according to claim 9 including turbine disposed in the flow path of said working fluid at one of said manifolds for causing rotation of said tube bundle.

13. (cancelled). A system according to claim 9 wherein portions of said catheter surfaces in contact with said body fluid are porous for infusion of substances carried by said working fluid into said body fluid.

14. (New) A heat transfer device comprising:

a multi-lumen catheter including a working fluid transfer pathway;

a first manifold for connecting the multi-lumen catheter to a return pathway;

a heterogeneous and compliant heat exchange portion connected to said first manifold, the heat exchange portion having a plurality of dynamic surface regions that provide internal and external boundary layer disruption;

a second manifold connected to the heat exchange portion that distributes the working fluid through the heat exchange portion; and

a high frequency working fluid pressure oscillator adapted to create surface dynamics in the heat exchange portion.

15. (New) The heat transfer device of claim 14 wherein the heat exchange portion provides for substantially augmented heat exchange rates resulting from the fluid-device interaction of the plurality of dynamic surface regions.

16. (New) The heat transfer device of claim 14, wherein said heterogeneous compliant heat exchange surface comprises segments of high and low compliance located adjacent to one another.

17. (New) The heat transfer device in claim 14, wherein said heterogeneous compliant heat exchange surface comprises a plurality of individual heat exchange surfaces, each having higher compliant segments to disrupt fluid boundary layers and interconnected via the said working fluid manifolds.

18. (New) The heat transfer device of claim 17 wherein the plurality of individual heat exchange surfaces comprises gas-permeable membranes having pores ranging from 0.01 to 0.05 micrometers.

19. (New) The heat transfer device of claim 14, wherein said compliant heat exchange surface has individual segments of higher compliant material that move radially towards and away from the longitudinal axis of the heat transfer device.

20. (New) The heat transfer device of claim 19 wherein the higher compliant segments are dynamic and travel towards and away from the longitudinal axis of the heat transfer device in the normal direction at a predetermined frequency.

21. (New) The heat transfer device of claim 20 wherein the frequency is in the range of 1- 20 Hz.

22. (New) The heat transfer device of claim 19 wherein the higher compliant segments travel radial distances during each cycle of motion from a fully expanded position to a fully contracted position.

23. (New) The heat transfer device of claim 22 wherein the radial distance is between 0.1 to 1 times the radius of the multilumen catheter radius.

24. (New) The heat transfer device of claim 22 wherein the radial distance depends upon the lumen in which said heat transfer device is used.

25. (New) The heat transfer device of claim 19 wherein when the higher compliant segments are in a fully expanded position have a shape that provides for boundary layer disruption and external fluid flow.

26. (New) The heat transfer device of claim 25 wherein the higher compliant segments comprise radial rings.

27. (New) The heat transfer device of claim 25 wherein the higher compliant segments comprise longitudinal protrusions.

28. (New) The heat transfer device of claim 25 wherein the higher compliant segments comprise individual protrusions.

29. (New) The heat transfer device of claim 25 wherein the higher compliant segments comprise helical protrusions.

30. (New) The heat transfer device of claim 19 wherein the higher compliant segments expand and contract as a result of working fluid pressure oscillations at a predetermined frequency.

31. (New) The heat transfer device of claim 30 wherein the working fluid pressure oscillations are created by substantially occluding the working fluid flow exiting the heat transfer device .

32. (New) A heat transfer device comprising:

a single lumen catheter including a working fluid pathway;

a compliant connective element connecting the single lumen catheter to a first manifold, the first manifold connecting said compliant connective element to a compliant heat exchange surface;

wherein during operation of the heat transfer device, the compliant heat exchange surface moves normal to and tangential to the longitudinal axis of the heat transfer device; and

a second manifold connected to said compliant heat exchange surface adapted to collect working fluid that exits the compliant heat exchange surface; and

a delivery device adapted to deliver working fluid to the inflatable distal manifold and remove working fluid from the inflatable distal manifold, thereby creating heat exchange surface dynamics.

33. (New) The heat transfer device of claim 32 whereby the heat exchange process is augmented by minimizing fluid flow obstruction as a result of said single lumen structure, and by creating said heat exchange surface motion.

34. (New) The heat transfer device of claim 32 wherein the second manifold is inflatable.

35. (New) The device of claim 32, wherein said compliant heat exchange surface comprises a plurality of compliant tubes.

36. (New) The device of claim 32, wherein the compliant tubes move inline with the longitudinal axis and normal to the longitudinal axis as said control system delivers and removes predetermined working fluid volume and to and from said inflatable distal balloon.

37. (New) The device of claim 32, wherein the compliant connective element expands and contracts as said control system delivers and removes working fluid to and from said inflatable distal balloon.

38. (New) A device for enabling a heat exchange process comprising:

a multi-lumen catheter for providing a working fluid pathway;

a proximal manifold for connecting said multi-lumen catheter, distributing the working fluid, and driving rotary motion of a compliant heat exchange surface;

a compliant heat exchange surface that spins about the longitudinal axis of the heat transfer device;

a distal manifold connected to said heat exchange surface adapted to collect the working fluid inside the said heat exchange surface; and

a control system adapted to circulate the working fluid and drive the rotary motion of the proximal manifold;

whereby the heat exchange process is augmented by creating a circumferential heat exchange surface motion,

39. (New) The device of claim 38 wherein the circumferential heat exchange surface motion reduces heat transfer resistance and promotes external fluid flow.

40. (New) The device of claim 38, wherein said proximal manifold uses sealed bearings to ensure proper rotation with minimal blood infiltration.

41. (New) The device of claim 38 further comprising an inflatable distal manifold.

42. (New) The device of claim 38 further comprising a distal manifold that has a pressure dependent orifice that meters working fluid infusion as a function of working fluid internal pressure.

43. (New) A method of altering organ temperature comprising:

inserting a guide wire and guide catheter into a patient;

inserting a distal protection filter along the guide catheter;

inserting a heat transfer device along a shaft of the distal protection filter,

locating the heat transfer device upstream of organ of interest;

positioning said heat transfer device concentric within an artery leading to the organ of interest;

circulating a gas soluble working fluid through said heat transfer device;

infusing said working fluid into external fluid to deliver rapid cooling in stage one of organ temperature alteration;

monitoring said infusion by applying mass balance about said working fluid and controlling internal working fluid pressure; and

reducing or eliminating infusion of said working fluid to maintain organ temperature in stage two of organ temperature alteration.